Job–education match and mismatch: Wage differentials

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Both governments and individuals are devoting increasing resources to postsecondary education. Between 1995/1996 and 2005/2006, public expenditures on postsecondary education increased 35%, from $23 billion to $31 billion, in 2001 constant dollars. At the same time, public expenditures on all types of education increased at a slower pace of 20% (Statistics Canada and CMEC 2007).

At the individual level, more people are pursuing higher education despite rising tuition fees.[1] Between 2001 and 2006, the proportion of people 25 to 64 years of age with a postsecondary certificate, diploma or degree increased from 53% to 61%. The sharpest increase was registered at the university level, where the growth rate was 32%.[2]

To understand the demand for university graduates in the labour market, the number of workers in occupations that require skills that are obtainable through university education or equivalent training can be examined. On this basis, 16% of the jobs in 2006 were classified as requiring a university degree or equivalent. Furthermore, between 2001 and 2006, the number of jobs that required a university degree increased by 14%, while the labour market expanded by 8.2% (Statistics Canada 2008 and 2003).

Although both supply and demand for skilled workers are increasing, there is no guarantee that the right candidate will be matched with the right job. Educators and policy makers attempt to cultivate an environment where workers can apply their education in the workplace (HRSDC 2009). One way to assess "the performance of the educational system in producing the graduates required in the labour market, and the efficiency of the labour market in matching graduates to jobs" (Finnie 2001) is to examine the prevalence of job skills–education mismatch and its effect on earnings.

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The existing literature on job–education mismatch in Canada mainly focuses on over-education. Individuals with more schooling than required for their jobs are considered overqualified, and thus mismatched. According to the 1982, 1986 and 1990 National Graduates Surveys (NGS), "anywhere from 27% to 48% of recent college, bachelor's and doctoral graduates were overqualified for their main job. At the master's level, the range was 48% to 72%" (Frenette 2000).

The over-education approach does not fully account for the possibility of mismatch between occupation-specific skills and field of study. Some occupation-specific skills require special training. For instance, a graduate who studied accounting rather than marketing at university would be better equipped to analyze financial statements at an accounting firm, although both disciplines are within the business domain.

In recent years, some researchers have started to explore job–education mismatch via the specific-skill-matching approach. For instance, Boudarbat and Chernoff (2009) studied education–job mismatch using the following question asked in the Follow-up Survey of Graduates (FOG): "How closely is the (main) job you held last week related to your certificate, diploma or degree?" In their analysis, 64.9% of graduates said their job closely matched their education, 22.5% said it was somewhat related, and 12.6% said it was not related at all. They concluded that education characteristics such as field and level of study and employment characteristics like industry and full-time/part-time status are significant determinants of education–job match.

This article's approach to specific-skill match differs from Boudarbat and Chernoff's in two major ways: it uses a different data source and it relates the match to a labour market outcome–earnings. This study is based on data from the 2006 Survey of Labour and Income Dynamics (SLID). In SLID, respondents who worked in 2006 were asked: "How closely was this job related to your education?" Similar to FOG, three types of

responses were possible: closely related, somewhat related and not at all related. Making use of this job–education matching indicator and the rich earnings information in SLID, this article examines whether there is a wage differential between prime-age workers whose job is closely related to their education and those not as well matched (see *Data source and definitions*).

The study begins with an overview of the matching indicator by various individual characteristics and presents the mean wages for individuals at each of the three levels of matching for these characteristics. The descriptive statistics indicate that a variety of characteristics affect match rates and that the wage effects vary by gender and level of education. Thus, the second section of the paper constructs models that incorporate these features to provide bounded estimates of the wage premium for a good job–education match.

Data source and definitions

The **Survey of Labour and Income Dynamics** (SLID) covers 97% of the Canadian population, excluding those in the territories, institutions, military barracks or on First Nations reserves. SLID is a sample survey with cross-sectional and longitudinal components. Each SLID sample is composed of two panels, and each panel consists of approximately 15,000 households. A panel is surveyed for a period of six consecutive years. A new panel is introduced every three years, so two panels always overlap.

Proxy response is accepted in SLID. This procedure allows one household member to answer questions on behalf of any or all other members of the household, provided he or she is willing to do so and is knowledgeable. When a person answers the survey questions for himself/herself, the responses are known as non-proxy responses.

Included in this study are those who worked in 2006 (i.e., from panels 4 and 5) and

- were between the ages of 25 and 54, non-university postsecondary or university graduates, non-proxy respondents
- had a valid response in the *relatedness indicator* variable
- had information in all of the following variables: hourly wage, age, sex, visible minority and immigration status, education level, major field of study, province, size of area of residence, occupation, industry, work schedule, job tenure, and firm size.[3,4]

The age restriction of 25 to 54 corresponds to the core working group concept where workers are relatively stable in their careers. Since the relatedness question requires the assessment of one's education and job nature, only non-proxy respondents are included. Hourly wage is used because it helps isolate the effect of hours worked on earnings. In all, these selection criteria leave about 7,000 records, representing 4 million people. Due to proxy response, close to 2,500 records were excluded even though they satisfied all other selection criteria.

The survey question that corresponds to the variable of interest—*relatedness indicator*—is: "How closely was this job related to your education?" The three possible responses are: closely related, somewhat related and not at all related. In cases where a respondent has multiple jobs, the relatedness indicator pertains to the main job. The main job for the year is defined as the one with the most scheduled hours ("usual hours") in the year. If hours are identical between two jobs, or in some cases where they are unknown, the main job may be the one with the greatest earnings or the longest tenure.

In the questionnaire, *education* is not defined. However, it will be assumed that respondents will consider the qualitative aspect rather than the quantitative aspect of *education*. The rationale for this assumption is that the word "related" is likely used to qualify rather than quantify. Other common interpretations of education like years of schooling and highest level of education attained only cover the quantitative aspect of education. For instance, a bachelor's degree holder with 16 years of schooling working at a job that required 16 years of schooling and a bachelor's degree is not likely to consider his/her job and education as closely related if he/she has an economics education background but works as a computer programmer. This assessment requires a qualitative comparison between one's field of study and one's job characteristics.

The basis for studying occupation-specific skills and field of study mismatch through examining people's perception of the relatedness of their job and education is that "(r)espondents themselves may be the best qualified to make this assessment since they understand more fully what their job is and what their program of study was designed to do. They are not restricted by having to classify their particular jobs or studies" (Lathe 1996) into one specific occupational group or a single field of study. Robst (2007a) elaborated on this point with many "majors provide students with a broad range of skills ... that apply to several different occupations. It would be difficult to develop an algorithm for determining whether a major and job are unrelated. The individual assessments, while perhaps subjective, are expected to provide important information." One caveat regarding this subjective approach is that the same pair of occupation-specific skills and field of study might not be rated equally because one's perception of 'related' might differ.

Job–education match and mismatch: Distribution and wage differentials

According to the 2006 SLID, about 58% of workers age 25 to 54 with a postsecondary certificate, diploma or degree considered their job and education to be closely related: 19% found themselves in a job that was somewhat related to their education, while 23% reported that their job and education were not at all related. Those in the closely related and the somewhat-related categories earned similar hourly wages, $27 and $26 respectively—significantly higher than the $20 mean wage rate for the not-at-all related group.[5]

Age and sex

The incidence of mismatch was similar for men and women and across different age groups, with the mismatch rate ranging from 18% to 26% (Table 1).

The gap in mean hourly wages between the closely related and the not-at-all related groups increased with age (Chart A). This was more evident for men than women. The wage gap among men was $5 in the 25 to 29 and 30 to 34 age groups, $8 for those 35 to 39 and 40 to 44, and over $10 for those 45 to 49 and 50 to 54. As for women, the 25 to 29 and 30 to 34 age groups registered a $6 wage difference. Beyond those 30 to 34, the gap widened to $9, with the exception of those 45 to 49, where the gap was $5.

Although these wage gaps between graduates in jobs closely related and not-at-all related to their education are based on cross-sectional data, the increase across age groups clearly indicates that the wage penalty for mismatches is persistent and may well grow through time within cohorts.

Interestingly, the difference in the mean hourly wage between the closely related group and the somewhat-related group was insignificant for men of all ages. Thus job tenure or other factors might become more important over time given a reasonable level of initial education-to-job match.

Highest level of education

Generally the higher the education level, the more likely individuals would be to hold a job closely related to their education (Table 2). While 68% of those with a university degree above the bachelor's level worked at a job that is closely related to their studies, the corresponding figure for non-university postsecondary graduates was 54%. Those with a university degree at or below the bachelor's level fell in between, at 60%. These findings are consistent with Boudarbat and Chernoff's (2009) estimates calculated using the NGS.

Using the proportion of people in the not-at–all-related category as the mismatch rate, 28% of non-university postsecondary graduates and 18% of university graduates did not have a job related to their studies.

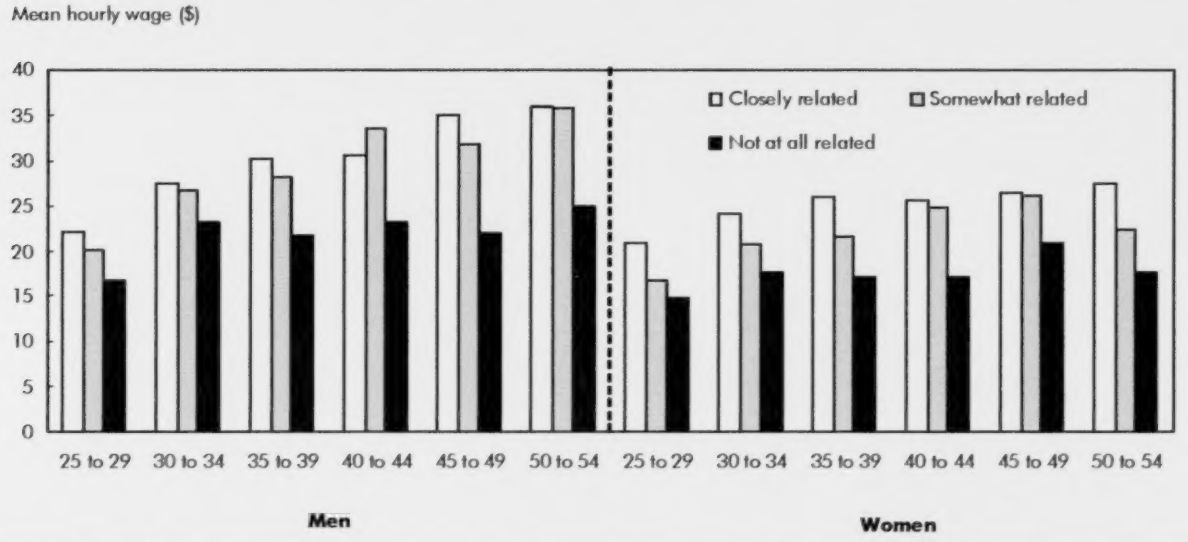
For each level of education, those who had a job closely related to their education earned more on average than those who had a job not at all related to their education. The wage difference between these two groups was $5 among the non-university postsecondary certificate holders. For those with a university degree above the bachelor's level, there was a $14 wage advantage for working at a job closely related to one's education compared to an unrelated job. Those with a university degree at the bachelor's level or below stood in between with a gap of $9. As

Table 1 Relatedness indicator by age and sex

	Men			Women		
	Closely related	Somewhat related	Not-at-all related	Closely related	Somewhat related	Not-at-all related
	%					
Age						
25 to 29	54	20	26	59	16	25
30 to 34	52	22	26	61	15	25
35 to 39	58	23	18	55	18	26
40 to 44	54	20	26	55	21	24
45 to 49	55	22	23	61	16	23
50 to 54	60	21	19	64	18	18

Source: Statistics Canada, Survey of Labour and Income Dynamics, 2006.

Chart A Mean hourly wage by sex, age and job-education relatedness indicator



Source: Statistics Canada, Survey of Labour and Income Dynamics, 2006.

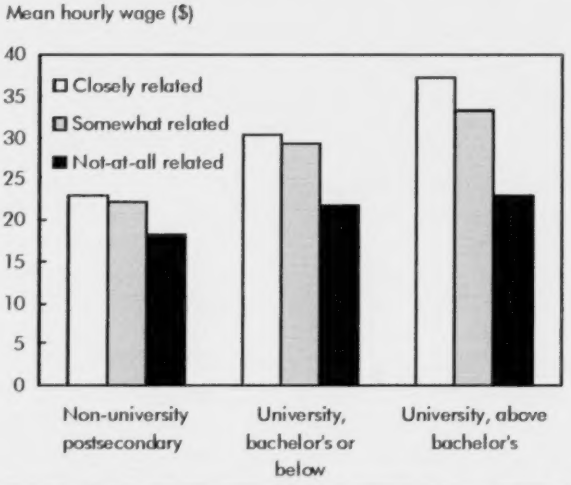
for the somewhat-related group, their hourly wage rate was just under the closely related group for each level of education, and the difference was not statistically significant (Chart B).

Major field of study

In general, graduates from highly specialized programs were likely to work at a job that was related to their education. Table 2 orders field of study by the proportion of graduates in the closely related category. Nearly four in five graduates from an education or a health program worked in jobs closely related to their studies. These two categories were also identified by Boudarbat and Chernoff (2009) as having the highest odds of a good job–education match. Higher-than-average employment growth in health care and education services was a likely contributor to the high match rates for these fields.[6] Other specialized fields such as physical and life sciences, and architecture and engineering also had relatively high match rates, at close to 60%.

Match rates in areas such as personal, protective and transportation services; business, management and public administration; agriculture, natural resources and

Chart B Mean hourly wage by education level and job education relatedness indicator



Source: Statistics Canada, Survey of Labour and Income Dynamics, 2006.

Table 2 Distribution of relatedness indicator

	Closely related	Somewhat related	Not-at-all related
		%	
Education			
University degree, above bachelor's	68	20	12
University degree or certificate, bachelor's or below	60	21	20
Non-university postsecondary certificate	54	18	28
Field of study			
Education	79	10	11
Health	78	7	15
Physical and life sciences and technologies	59	18	23
Architecture, engineering and related technologies	59	17	24
Personal, protective and transportation services	54	13	33
Business, management and public administration	54	26	21
Agriculture, natural resources and conservation	52	18	30
Mathematics, computer and information sciences	51	27	21
Social and behavioural sciences and law	48	22	30
Humanities	44	25	31
Visual and performing arts, and communications technologies	43	18	40
Other[1]	43	19	38
Job skill-level			
Management	51	29	20
Professional	81	13	6
Technical, paraprofessional and skilled	62	19	19
Unskilled	34	21	45
Work schedule			
Full-year, full-time worker	60	20	21
Other	52	17	31
Job tenure (years)			
Less than 5	55	19	26
5 to less than 10	58	20	22
10 to less than 15	60	18	22
15 to less than 20	65	18	18
20 to less than 25	59	24	18
25 and over	65	18	17
Firm size			
Less than 20	52	18	31
20 to 99	57	19	24
100 to 499	57	17	26
500 to 999	66	18	16
1,000 and over	59	20	21

1. Includes Parks, recreation, leisure and fitness studies, and personal improvement and leisure.
Source: Statistics Canada, Survey of Labour and Income Dynamics, 2006.

conservation; and mathematics, computer and information sciences were between 50% and 60%. All four remaining fields had less than 50% in the closely related category. "Not related at all" was the most frequent response for graduates in visual and performing arts, communications technologies (40%) and studies related to parks, recreation, leisure and fitness studies and personal improvement and leisure (38%).

The wage gap between the closely related group and the not-at–all-related group was greatest in the highly specialized fields (Table 3). The hourly wage gap between these groups was $12 in health and $10 in education studies. The gap for agriculture, natural resources and conservation, and mathematics, computer and information sciences was $9.

The smallest wage difference between the closely related group and the not-at-all related group was in visual and performing arts ($5), and personal, protective and transportation services ($3 and not statistically significant).

Job skill level

Job skill level is derived from occupation. The Essential Skills Research Project by Human Resources and Skills Development Canada (HRSDC) made it possible to estimate the skill level of each occupation in the National Occupation Classification (NOC). The assigned skill level code reflects both the education level usually required in the labour market and some criteria covering experience, specific training and responsibility related to health and safety (as in the case of police officers and nurses) (Galarneau and Morissette 2008).

Table 3 Average hourly wage by relatedness indicator

	Closely related	Somewhat related	Not-at-all related
		$	
Field of study			
Health	27	21	15
Education	28	22	18
Agriculture, natural resources and conservation	27	23	17
Mathematics, computer and information sciences	29	25	20
Business, management and public administration	29	27	20
Humanities	29	27	21
Social and behavioural sciences and law	27	30	19
Physical and life sciences and technologies	30	26	23
Architecture, engineering, and related technologies	28	27	21
Other[1]	29	22	23
Visual and performing arts, and communications technologies	22	18	17
Personal, protective and transportation services	20	24	17
Work schedule			
Full-year, full-time worker	29	28	22
Other	23	18	15
Job tenure (years)			
Less than 5	24	22	17
5 to less than 10	28	28	21
10 to less than 15	31	30	22
15 to less than 20	32	31	25
20 to less than 25	34	31	27
25 and over	32	32	25
Firm size			
Less than 20	21	21	16
20 to 99	24	20	19
100 to 499	26	24	17
500 to 999	28	34	19
1,000 and over	31	29	23

1. Includes Parks, recreation, leisure and fitness studies, and personal improvement and leisure.
Source: Statistics Canada, Survey of Labour and Income Dynamics, 2006.

In this system, managers are not assigned a skill level due to the diversity of their experience and education level—they are grouped under the management skill level. There are four skill levels and their corresponding education level requirements are the following:

- management – managers
- professional – some university education
- technical, paraprofessional and skilled – a non-university postsecondary diploma, certificate, or apprenticeship training
- unskilled – no more than a high school diploma.

A large majority (81%) of those occupying a professional position—the highest skill level—said their job was closely related to their field of study; only 6% of them reported having a job not at all related to their field of study. This corresponds to the specific nature of high-skilled occupations.

Those in unskilled jobs were more likely to be in jobs that were unrelated to their schooling: 45% of them reported that their jobs were not at all related to their education. Just over one-half of the managers were in positions closely related to their education, reflecting the diverse backgrounds of managers.

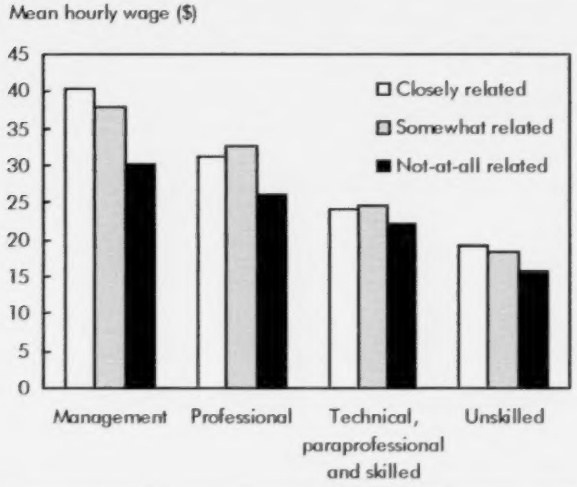
For each job skill level, the closely related group had a wage advantage over the not-at-all related group (Chart C). The biggest gap was found in the management group ($10 per hour). For professionals, on the other hand, the wage rates between the three groups were statistically insignificant. In the technical, paraprofessional, skilled category, the closely related group made only marginally more than the not-at-all related group. For the unskilled category, slightly higher earnings were seen for the closely related group compared to the not-at-all related group.

Work schedule, job tenure and firm size

Those with a full-year, full-time job were more likely to rank their job as closely related to their education than people with other types of work schedules (60% vs. 52%). Full-year full-time workers earned more than workers who either worked part time or part year. However, regardless of the work schedule, the closely related group earned more than the not-at-all related group—their respective wages were $29 and $22 for those who worked full time, all year, and $23 and $15 for those worked other types of schedules.

Job tenure is a measure of time in the current job. Job–education mismatch decreases with job tenure. Among people who had been in their jobs for less than 5 years, 26%

Chart C Mean hourly wage by job skill-level and job-education relatedness indicator



Source: Statistics Canada, Survey of Labour and Income Dynamics, 2006.

of them did not feel there was any relationship between their job and education. For people who stayed in their jobs for 5 to less than 15 years, their mismatch rate was 22%. For people who had been in their jobs for 15 years or more, the mismatch rate was around 18%.

Generally speaking, hourly wages increased with job tenure for 10 to 15 years and then plateaued. A wage gap persisted between the closely related group and the not-at-all related group for all tenure categories. The size of the gap did not change systematically with experience, indicating that the pace of wage growth was very similar between these two groups.

People working in firms with less than 20 employees were less likely to be in jobs closely related to their education. The mean hourly wage differed slightly between the closely related category and the not-at-all related category for these small firms (a $5 difference). In contrast, firms with 100 employees or more had a distinct gap between the closely related group and the not-at-all related group in terms of hourly wages. The former group earned $8 to $9 more per hour than the latter group.

Modeling the job–education match and wages

Thus far, high wages seem to be accompanied by good job–education matches. Wages, at the same time, seem to be associated with factors such as level of education and various occupational characteristics. To quantify the effect of job–education match/mismatch on wages, it is necessary to control for many factors simultaneously. Regression analyses can be used to estimate the effect of the relatedness indicator on wages while controlling for observable attributes such as demographic information, educational attainment and specialization, labour market characteristics and geographical characteristics (see *Statistical methods*).

The models were run separately for men and women at each level of education (see *Statistical methods*). For each combination, two sets of results are presented. The first includes demographic and geographic factors. The second adds job characteristics. These models provide upper and lower bounds on the estimated effect of the match variables on wages.[8]

Male non-university postsecondary graduates[9]

In the model that includes demographic and geographic factors, the wage difference between the closely related group and the not-at-all related group is 23%, and the wage difference between the somewhat-related group and the not-at-all related group is 13%. The wage difference between the closely related group and the somewhat-related group is also statistically significant (Table 4).

When job characteristics enter the model, the effect of job–education match on wages become less pronounced. The closely related group has a 14% wage advantage over the not-at-all related group. The 6% wage difference between the somewhat-related group and the not-at-all related group and the 7% wage difference between the closely related group and the somewhat-related group are not statistically significant at the 5% level.

Female non-university postsecondary graduates[10]

For women who graduated from non-university postsecondary schools, the effect of job–education match on hourly wages in the model with demographic and geographic factors was larger than for men. The hourly wage of a female non-university postsecondary graduate who has a job that is closely related to her education is about 31% higher than what she would have earned if she were in a job not at all related to her

Table 4 Relative effects of relatedness indicator on wages

	Wage premium	
	Model with demographic and geographic factors	Model with demographic and geographic factors and job characteristics
	%	
Non-university postsecondary graduates		
Men		
Closely related vs. not-at-all related	22.9***	13.6***
Somewhat related vs. not-at-all related	13.2**	6.4n.s.
Closely related vs. somewhat related	8.6**	6.8*
Women		
Closely related vs. not-at-all related	31.3***	16.9***
Somewhat related vs. not-at-all related	18.4***	9.1***
Closely related vs. somewhat related	10.9***	7.1**
University graduates - bachelor's or below		
Men		
Closely related vs. not-at-all related	44.0***	30.9***
Somewhat related vs. not-at-all related	39.1***	27.3***
Closely related vs. somewhat related	3.5n.s.	2.8n.s.
Women		
Closely related vs. not-at-all related	44.7***	23.5***
Somewhat related vs. not-at-all related	16.8***	4.8n.s.
Closely related vs. somewhat related	23.9***	17.8***
University graduates - above bachelor's		
Men		
Closely related vs. not-at-all related	58.3***	42.8***
Somewhat related vs. not-at-all related	26.8n.s.	20.3n.s.
Closely related vs. somewhat related	24.8*	18.7*
Women		
Closely related vs. not-at-all related	45.2**	26.2n.s.
Somewhat related vs. not-at-all related	38.3*	30.7*
Closely related vs. somewhat related	5.0n.s.	-3.4n.s.

*** significantly different at the 0.01 level, ** at the 0.05 level, * at the 0.10 level, n.s. not significantly different

Source: Statistics Canada, Survey of Labour and Income Dynamics, 2006.

education. The wage difference between the somewhat-related and the not-at-all related category is 18%.

When job characteristics are included in the model, the effect of the relatedness indicator on wages drops sharply. The wage difference between the closely related group and the not-at-all related group is 17%, and the wage difference between the somewhat-related group and the not-at-all related group is 9%. These effects are smaller than those in the upper bounds model, yet they are still statistically significant.

University graduates

For university graduates, interaction terms are added to allow the effect of match quality on wages to differ by degree level—above bachelor's level versus bachelor's level or below.

Male university graduates[11]

In the model with demographic and geographic controls, men with a university degree above the bachelor's level working in a job that is closely related to their education earn about 58% and 25% more than those in the not-at-all related and the somewhat-related categories, respectively. Although the wage difference between the somewhat-related and the not-at-all related categories is 27%, it is not statistically significant.

For male university graduates at the bachelor's level or below, having a job closely related or somewhat related to their education as opposed to having a job not-at-all related to their education would increase wages by an estimated 44% and 39%, respectively, in the model with demographic and geographic factors. There is virtually no wage difference between the closely related and somewhat-related groups for these male university graduates at the bachelor's level or below.

After job characteristics are factored into the model, the wage advantage of having a job that is closely related to one's education remains strong. Among men with a university degree above the bachelor's level, the wage return is 43% higher for those with a very good job–education match than those with a poor match. Among men with a university degree at the bachelor's level or below, the wage effect of a good job–education match versus a poor job–education match is 31%.

The comparison between the somewhat-related group and the not-at-all related group indicates no significant difference in hourly wage for men with a university degree above the bachelor's level. However, this is not true for men

Statistical methods

Regression analyses were performed to estimate the association between the job–education relatedness indicator and wages. Weighted data were used to produce the estimates. Statistical inferences are based on bootstrap weights.[7] The regression model was specified as follows:

$$\ln(\text{wage}) = \beta_0 + \beta_1 (X_{CR}) + \beta_2 (X_{SR}) + X\alpha + \varepsilon,$$

where X_{CR} is used to indicate a job that is closely related to one's education, and X_{SR} is used to indicate a job that is somewhat related to one's education. The not-at-all related category of the relatedness indicator is the comparison group. The wage ratio between the closely related group and the not-at-all related group can be obtained by exponentiating β_1, and likewise for β_2.

X is a vector of control variables and α is a vector of effects of these factors on wages.

The factors in X can be put into three main categories:

- Demographic factors – age, visible minority, immigration status, level of education, major field of study
- Geographic factors – region of residence, urban-rural size
- Job characteristics – occupation, industry, work schedule, job tenure, firm size.

ε includes any other unaccounted for factors. These factors are assumed to be uncorrelated with the relatedness indicator.

Since men and women dominate in different fields of study, and non-university postsecondary graduates and university graduates represent different types of training, their labour market outcomes would likely be different. Due to the presence of such heterogeneity, four separate regression models—one for male non-university postsecondary graduates, one for female non-university postsecondary graduates, one for male university graduates and one for female university graduates—were run to study the association between the hourly wage and the relatedness indicator for each group.

Furthermore, for university graduates, interaction terms were added to allow the effects of the relatedness indicator to be different for those with a bachelor's degree or below and those with a degree that is beyond the bachelor's level.

with a university degree at the bachelor's level or below—the wage difference of 27% is significant between the somewhat-related group and the not-at-all related group.

Female university graduates[12]

As in the case for male university graduates, all models that include the demographic dimension will have two sets of relatedness effects estimates—one for above bachelor's level and one for bachelor's level or below.

In the model where demographic and geographic factors are specified, the closely related group earns an estimated 45% more than the not-at-all related group regardless of educational attainment. The effect of job–education match for those with a university degree above the bachelor's level and those with a university degree at the bachelor's level or below differs for the somewhat-related category. Wages for the closely related group and the somewhat-related group differ by less than 5% for those above the bachelor's level, but over 23% for those at the bachelor's level or below.

When the model is augmented with job characteristics, the relatedness indicator is no longer statistically significant among those with a degree above the bachelor's level, in spite of the 26% and 31% wage advantage of the closely related group and the somewhat-related group over the not-at-all related group. This lack of precise estimates may be due to the small sample size in the not-at-all related reference category.

On the other hand, the relatedness factor remains significant for those with a degree at the bachelor's level or below in this model. Those with a job closely related to their education are estimated to earn 18% and 24% more respectively than those with a job somewhat-related or not-at-all related to their education. The wage difference between the somewhat-related group and the not-at-all related group is not statistically significant (5%).

Overall, sizeable wage premiums were estimated for men and women at all levels of education when just demographic and geographic variables were included in the models. The premium decreased in size but remained large and statistically significant for all groups except women with a university degree above the bachelor's level. The estimated wage premiums in this Canadian study are somewhat higher than those found in Robst (2007a) for the U.S. even though the educational match rate was similar.

Summary

The 2006 Survey of Labour and Income Dynamics indicates that 58% of the workers age 25 to 54 with a postsecondary certificate or degree considered their job and education to be closely related; 19% said that the relationship between the two was somewhat related; and 23% did not think there was any relationship at all between their job and education.

The mean wage rates for those in the closely related category and the somewhat-related category were similar: $28 and $26, respectively. However, they were higher than the $20 mean wage rate for the not-at-all related group. The wage gap between the closely related group and the not-at-all related group was larger at higher levels of education.

Models that accounted for many factors related to wages such as demographic and geographic attributes and occupational characteristics validated the positive return to working at a job closely related to one's education, although the magnitude of the return varies between men and women, and by type and level of postsecondary education. The reward for working in a job closely related to one's education is greater for university graduates than non-university postsecondary graduates.

For male university graduates above the bachelor's level, the estimated wage difference between the closely related group and the not-at-all related group is over 40%. Among women with the same level of education, the estimated wage rates of these two categories are not significantly different. This is likely due to a high incidence (about 95%) of finding a job in the closely related or somewhat-related categories among these women, leaving an imprecisely measured reference group.

For male university graduates with a bachelor's degree or below, holding a job that is at least somewhat related to one's education increases wages by at least 27%. For women with the same level of education, finding a job that is closely related to one's education boosts wages by 24%.

A previous study found that postsecondary graduates ranked high pay as their number-one criterion for selecting a job (Clark 1999). The current study indicates that the opportunity for higher wages is likely to be maximized in a job that is closely related to one's field of study. The magnitude and breadth of these results is such that there may be positive macro-economic returns to improved matching of graduates to jobs.

Although close to one-quarter of the graduates worked in a job that was not-at-all related to their field of study, it might be possible that some people take on a position that is entirely unrelated to their field of study voluntarily. Robst (2007b), looking at reasons for not having a job related to one's education, found that mismatch associated with pay and promotion opportunities and change in career interests actually had a positive effect on earnings. Other reasons such as working conditions, job location, family-related matters and no available job in the highest degree field would reduce wages. While pay is the primary motivator, other factors may be involved: individuals working in an unrelated field could be trading off higher wages for other preferences.

Notes

1. Average undergraduate university tuition fees rose from under $2,000 in the early 1990s to $3,500 ten years later. By 2005/2006, tuition fees averaged about $3,800. (All figures are in 2001 constant dollars.)
2. Data source: 2001 Census and 2006 Census. While these figures include immigrants who obtained their degrees outside Canada, the number of degrees granted in Canada increased 26% during the same period.
3. A detailed definition for each variable can be found in the *SLID Electronic Data Dictionary* at http://www.statcan.gc.ca/pub/75f0026x/75f0026x2009000-eng.htm.
4. Variables such as aboriginal status, disability status, marital status, family composition, presence of children between 0 and 5 in the family, presence of children between 6 and 17 in the family and union status have also been looked at, but they do not seem to have an effect on the behaviour of the relatedness variable.
5. Unless otherwise stated, all wage comparisons made in the article are statistically significant at 5%.
6. According to the Labour Force Survey, the labour market in aggregate produced 1.4% more positions between 2005 and 2006. For health occupations, the growth rate was 3.0%, and for occupations in education, the growth rate was 4.6%.
7. The following symbols are used in the discussion of the regression models. *** statistically different at 1% ** statistically different at 5% * statistically different at 10%
8. This approach is taken due to potential variation in the interpretation of the match question by respondents. The model without job characteristics is the upper bound since it undercontrols for job characteristics that may be associated with wages. The model with job characteristics is the lower bound since it may overcontrol for job characteristics that were not assessed by respondents who answered the match question.
9. Sample size for male non-university postsecondary graduates is 1,781.

10. Sample size for female non-university postsecondary graduates is 2,551.

11. Sample size for male university graduates is 1,155.

12. Sample size for female university graduates is 1,669.

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